MD60

RELIANCE ELECTRIC

For applications from 0.25 to 5 HP, the MD60 is a simple AC Microdrive that can be panel mounted as well as wall or machine mounted.

Reliance Electric's MD60 AC Drive is ready to operate out-of-the-box! The drive includes a built-in LED display and operator controls, including a single turn potentiometer for speed reference. Built-in dynamic braking circuitry only requires the addition of a braking resistor to meet higher performance application needs to handle fast accel & decel rates.

Price, Practicality & Performance

This is the criteria that drove the development of the MD60 AC Drive. This product offering is targeted at the fastest changing and growing segment of the variable speed drive market. The market from fractional to five horsepower.

Configuration & Displays

The parameters of the MD60 are segregated into groups, P-Parameters which reflect the basic values required for operation, and A-Parameters which are associated with more advanced use. This simplifies setup and minimizes customer exposure to unwanted parameters during startup.

During use, the operator can monitor as many as 19 D-Parameters to display values such as Output Frequency, Output Current, Output Amps, as well as the status of specific I/O points and the firmware version level.

Fault conditions are identified by alpha-numeric codes such as F2. Each MD60 AC Drive has a label adhered to its left side providing a description of the Fault Codes, as well as the most common Display and Basic Configuration Parameters to help in setup and during use.

Application Considerations

The MD60 is a Volts per Hertz controller which is suitable for general purpose use in a multitude of applications. Listed below are some of the Advanced Parameter functions which are useful when configuring the MD60.

Variable Torque Use

Centrifugal fans and pumps are well suited for the MD60 which will provide good speed control beyond the 10:1 speed range normally required by these applications (i.e. 180 to 1800 RPM). Some the advanced parameter functions that can be considered during setup and operation include;

- Output Carrier Frequency selection which is adjustable from 2 to 16 kHz, to achieve low acoustic motor operation.
- Reverse Disable since fans and pumps are uni-directional and can become damaged if inadvertently operated in reverse.
- Auto-Restart with up to 9 attempts, along with a settable delay time between attempts, since many variable torque applications operate un-manned in remote areas.

Also, with 2 Analog Inputs standard, an isolated 0-10 VDC and a 4-20 mA input, the MD60 can be easily used in any automated process control system.

Constant Torque Use

For simple conveyors, mixers, agitators, and machine applications, the MD60 provides a cost effective solution. These applications will benefit from the 200% Over Current (for 3 seconds) capacity of the MD60 Microdrive. Some additional advanced parameter features include:

- Start Boost (Voltage Boost) improves breakaway torque at the low end of the drive's frequency output.
- S-Curve Acceleration may enhance performance and control of high inertia loads by tapering changes in speed rates during initial starts, as well as when approaching desired speed settings.
- Dynamic Braking provides the ability to dissipate excessive DC Bus Voltage and thereby avoid High Bus Fault conditions normally experienced during extremely fast acceleration rates as well as in fast deceleration rates where the inertia of the load attempts to overhaul the electric motor.

Global Design

MD60 is a true Global Design which meets the standards for North & South America, Europe, Australia and Asia. One product for the World Market.

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Drive Ratings

Drive Ratings					
Input Voltage	kW	HP	Output Current	Model Number	Frame Size
115V, 50/60 Hz 1-Phase	0.2	0.25	1.5A	6MDVN-1P5101	A
	0.37	0.5	2.3A	6MDVN-2P3101	A
	0.75	1.0	4.5A	6MDVN-4P5101	B
230V, 50/60 Hz 1-Phase With Integral EMC Filter	0.2	0.25	1.5A	6MDAN-1P5111	A
	0.37	0.5	2.3A	6MDAN-2P3111	A
	0.75	1.0	4.5A	6MDAN-4P5111	A
	1.5	2.0	8.0A	6MDAN-8P0111	B
230V, 50/60 Hz 1-Phase No Filter	0.2	0.25	1.5A	6MDAN-1P5101	A
	0.37	0.5	2.3A	6MDAN-2P3101	A
	0.75	1.0	4.5A	6MDAN-4P5101	A
	1.5	2.0	8.0A	6MDAN-8P0101	B
230V, 50/60 Hz 3-Phase	0.2	0.25	1.5A	6MDBN-1P5101	A
	0.37	0.5	2.3A	6MDBN-2P3101	A
	0.75	1.0	4.5A	6MDBN-4P5101	A
	1.5	2.0	8.0A	6MDBN-8P0101	A
	2.2	3.0	12.0A	6MDBN-012101	B
	3.7	5.0	17.5	6MDBN-017101	B
460V, 50/60 Hz 3-Phase	0.37	0.5	1.4A	6MDDN-1P4101	A
	0.75	1.0	2.3A	6MDDN-2P3101	A
	1.5	2.0	4.0A	6MDDN-4P0101	A
	2.2	3.0	6.0A	6MDDN-6P0101	B
	3.7	5.0	8.7A	6MDDN-8P7101	B

Drive Parameters: Basic Group*

No.	Parameter Name	Default Value
P031	Motor NP Volts	Varies
P032	Motor NP Hertz	60 Hz
P033	Motor OL Current	Varies
P034	Minimum Frequency	0 Hz
P035	Maximum Frequency	60 Hz
P036	Start Source	0 = Keypad
P037	Stop Mode	1 = Coast, Clear Fault
P038	Speed Reference	0 = Drive Potentiometer
P039	Accel Time 1	5.0 sec.
P040	Decel Time 1	5.0 sec.
P041	Reset to Defaults	0 = Idle State

* The 11 parameters in this group represent the minimum requirement for basic operation.

Drive Parameters: Advanced Group**

Parameter Name	Default Value
Digital In1 Select	4 = Preset Frequencies
Digital In2 Select	4 = Preset Frequencies
Relay Output Select	0 = Ready (Not Faulted)
Relay Output Level	0.0
Accel Time 2	10.0 sec.
Decel Time 2	10.0 sec.
Internal Frequency	0.0 Hz
Preset Frequency 0	0.0 Hz
Preset Frequency 1	0.0 Hz
Preset Frequency 2	0.0 Hz
Preset Frequency 3	0.0 Hz
Jog Frequency	10.0 Hz
Jog Accel/Decel	10.0 sec.
DC Brake Time	0.0 sec.
DC Brake Level	Amps x 0.5
DB Resistor Select	0 = Disabled
S Curve%	0% (Disabled)
Start Boost	8 = 5.0
Maximum Voltage	Rated Volts
Current Limit	Amps x 1.8
Motor OL Select	0 = No Derate
PWM Frequency	4.0 kHz
Auto Restart Tries	0
Auto Restart Delay	1.0 sec.
Start At Power Up	0 = Disabled
Reverse Disable	0 = Reverse Enabled
Flying Start Enable	0 = Disabled
Compensation	1 = Electrical
SW Current Trip	0.0 (Disabled)
Process Factor	30.0
Fault Clear	0 = Ready
Program Lock	0 = Unlocked
Testpoint Select	0000
Comm Data Rate	4 = 19.2 K
Comm Node Address	1
Comm Loss Action	0 = Fault
Comm Loss Time	5.0
Comm Format	0 = RTU 8-N-1

** Parameters within this group are accessed without any password required. The parameters are presented this way for identification purposes only, to help simplify setup.

Display Parameters

d001	Output Frequency
d002	Command Frequency
d003	Output Current
d004	Output Voltage
d005	DC Bus Voltage
d006	Drive Status
d007	Fault 1 Code
d008	Fault 2 Code
d009	Fault 3 Code

d010	Process Display
d012	Control Source
d013	Control Input Status
d014	Digital Input Status
d015	Comm Status
d016	Control SW Version
d017	Drive Type
d018	Elapsed Run Time
d019	Testpoint Data

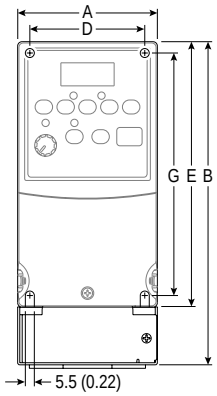
Mounting Dimensions

Frame	A	B(1)	C	D	E(2)	F	G	Shipping Weight
A	80 (3.15)	185 (7.28)	136 (5.35)	67 (2.64)	152 (5.98)	59.3 (2.33)	140 (5.51)	1.4 kg (3.1 lbs)
B	100 (3.94)	213 (8.39)	136 (5.35)	87 (3.43)	180 (7.09)	87.4 (3.44)	168 (6.61)	2.2 kg (4.9 lbs)

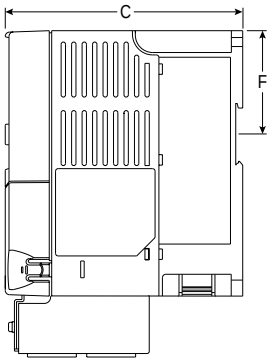
mm (in)

1 Height dimension includes optional NEMA 1/IP30 kit

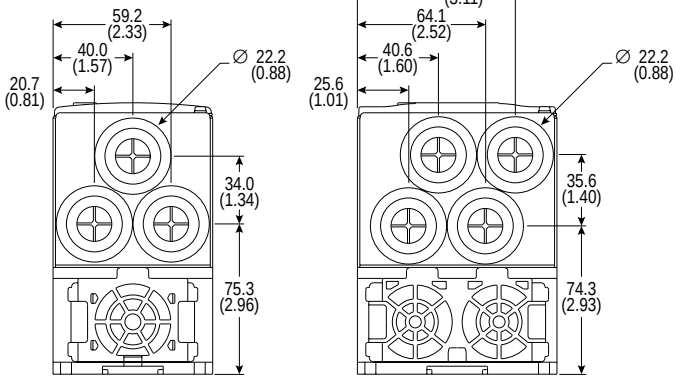
2 Height dimensions without optional NEMA 1/IP30 kit



Front

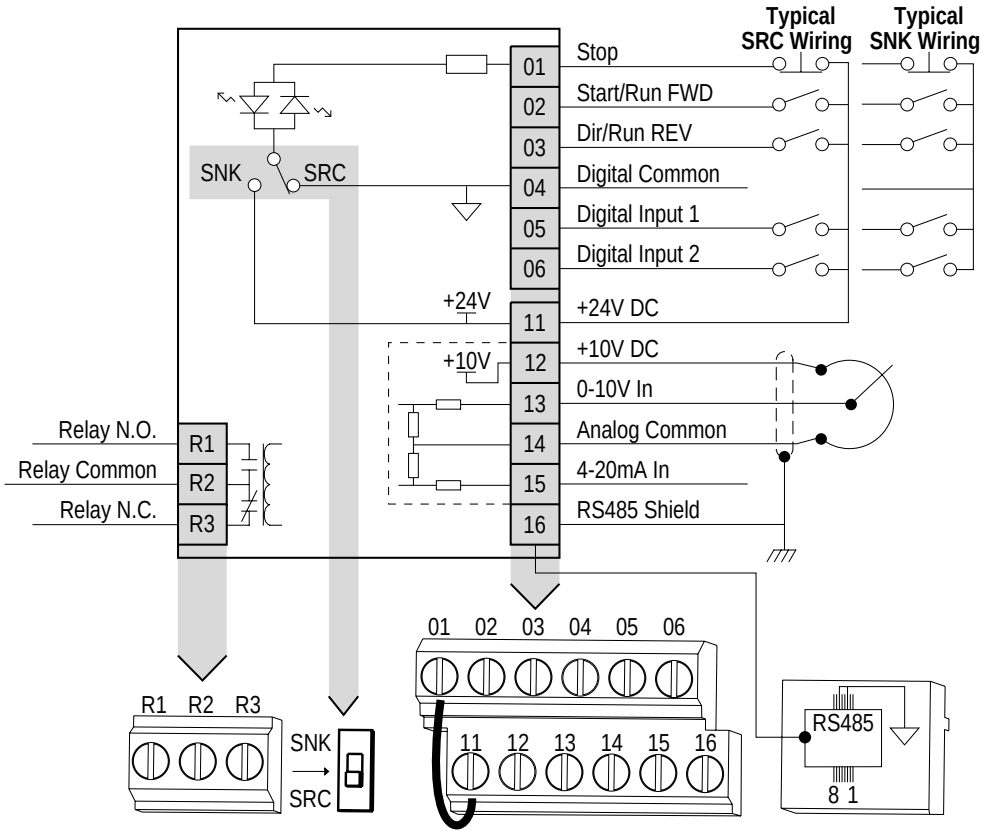


Side



Bottom View with NEMA 1/IP30 Kit

Typical Wiring Connections to the Control Terminal Block



Drive Specifications

Category	Specifications
Environment	
	Altitude: 1,000 m (3,300 ft) maximum without derating
	Ambient operating temperature without derating: IP20: -10°C (14°F) to 50°C (122°F) NEMA 1/IP30: -10°C (14°F) to 40°C (104°F)
	Storage Temperature (all constructions): -40°C (-40°F) to 85°C (185°F)
	Relative Humidity: 0% to 95%, non-condensing
	Shock (Operating): 15G peak for 11 ms duration (± 1.0 ms)
	Vibration (Operating): 1 G peak, 5 to 2000 Hz
Input/Output Rating	
	Voltage Output: 0 to Nominal AC Line Voltage Level; IGBT Transistors, PWM waveform
	Output Frequency: 0-240 Hz (Programmable)
	Efficiency: 97.5% (Typical)
Control	
	Carrier Frequency: 2-16 kHz. Drive rating based upon 4 kHz.
	Frequency Accuracy Digital Input: Within ± 0.05% of set output frequency Analog Input: Within 0.5% of maximum output frequency
	Speed Regulation - Open Loop with Slip Compensation: ± 2% of base speed across a 40:1 speed range.
	Stop Modes: Multiple programmable stop modes including: Ramp, Coast, DC-Brake, Ramp-to-Hold, and S-Curve.
	Accel/Decel: Two independently programmable accel and decel times. Each may be programmed from 0-600 seconds (0.1 second increments).
	Intermittent Overload 150% Overload capability for up to 1 minute 200% Overload capability for up to 3 seconds
	Internal Braking IGBT included on all ratings 0.75 kW (1 HP) and larger
	Electronic Motor Overload Protection: Class 10 protection with speed-sensitive response.
Digital Control Inputs	
	SRC (Source) Mode: 18-24 V = ON; 0-6 V = OFF
	SNK (Sink) Mode: 0-6 V = ON; 18-24 V = OFF
Analog Control Inputs	
	4-20 mA Analog: 250 ohm input impedance
	0-10 V DC Analog: 100k ohm input impedance
	External Pot: 1-10 k ohms, 2 Watt minimum
Fuses & Circuit Breakers	
	Recommended Fuse Type: UL Class J, CC, T or Type BS88; 600 V (550 V) or equivalent

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Drive Specification con't

Category	Specifications			
Protective Features	**MD60**	**100-120 VAC Drive**	**200-240 VAC Drive**	**380-480 VAC Drive**
	Bus Overvoltage Trip	405 VDC	405 VDC	810 VDC
	Bus Undervoltage Trip	210 VDC	210 VDC	390 VDC
	Software Current Limit	150% for 60 sec., 200% for 3 sec.; Class 10		
	Hardware Current Limit	200% Hardware Limit		
	Instantaneous Current Limit	300% Instantaneous Fault		
	Power Dip Ride-Through	Minimum 0.5 seconds - typical 2 seconds		
	Fault-Free Ride-Through	100 milliseconds		
Motor Lead Length (specific to 440-480 motor operation)				
	Motor insulation of 1000 V p-p	motor cable length 15 meters (49 ft)		
	Motor insulation of 1200 V p-p	motor cable length 40 meters (131 ft)		
	Motor insulation of 1600 V p-p	motor cable length 170 meters (558 ft)		
Agency Certification				
	c UL us	UL and cUL Listed to UL508C and CAN/CSA-C2.2 Mp/ 14-M91		
	CE Consult the MD60 Instruction Manual for details pertaining to conformance to CE Directives.	European Low Voltage Directive (73/23/EEC) EN50178 Electronic equipment European EMC Directive (89/336/EEC) EN61800-3 (Second Environment)		
	N223	Austrailian EMC Directive		

Consider these product options:

NEMA 1 (IP30) Kits	
Frame	**Model Number**
A	6MD-NM1A
B	6MD-NM1B

V*S Utilities Configuration Tools	
Description	**Model Number**
MD60 Serial Converter Module and cables. Includes all hardware required to connect the MD60 and laptop PC.	MDCOMM-232
V*S Utilities Software on CD-ROM	RECOMM-VSUTIL

EMC Filters for Compliance to CE Emissions standards	
Description *	**Distance**
Short distance filters - Externally mounted	≤ 5 meters
Long distance filters - Externally mounted	≤ 100 meters

Consult the product catalog for details regarding filters by specific drive model numbers

Instruction Manuals

MD60 AC Drive User Manual:D2-3499

For more information regarding the MD60 AC Drive from Reliance Electric, or for information on other Reliance Electric Products, visit our website at **www.reliance.com/drives**. At this location you will find promotional information as well as technical information regarding the selection, application and use of Reliance Electric AC & DC Drive products.

To order replacement copies of a lost or damaged instruction manual, visit our website, www.theautomationbookstore.com. At this location you will be able to order printed manuals for all current and most legacy Reliance Electric Drives.

Our Post Sales Technical Support Staff can also help you after your purchase: **Phone: 1-800-726-8112 Fax: 440-646-7364**.

This document located at:
http://www.reliance.com/drives

NOTE: This material is not intended to provide operational instructions. Appropriate Reliance Electric Drives instruction manuals precautions should be studied prior to installation, operation, or maintenance of equipment.

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